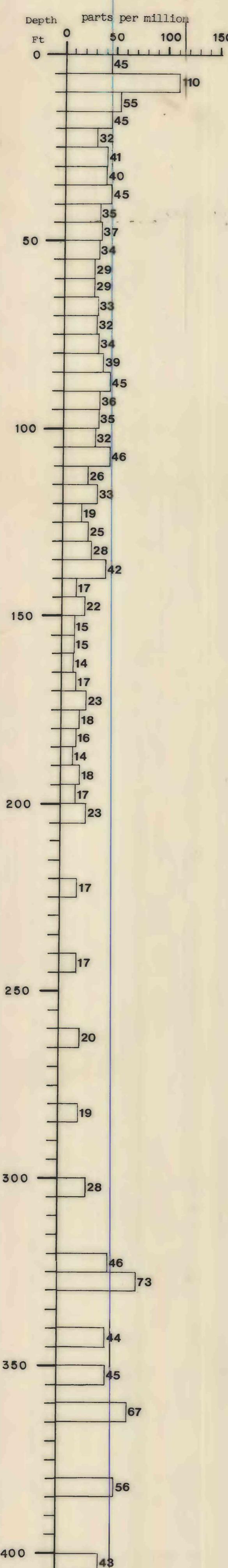
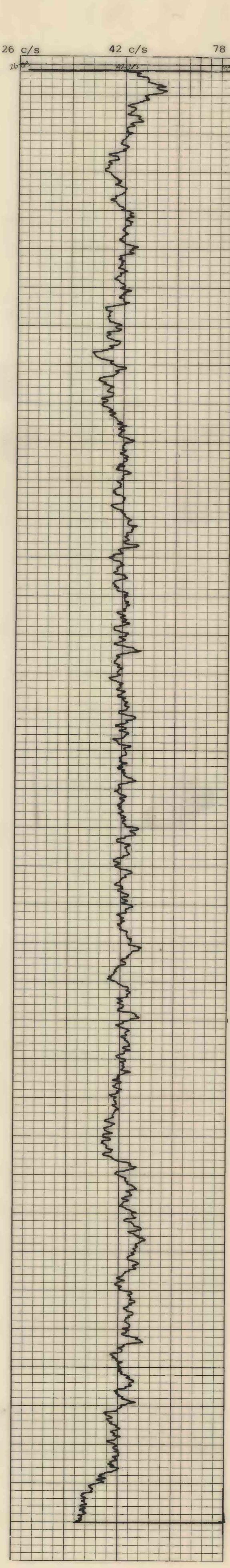
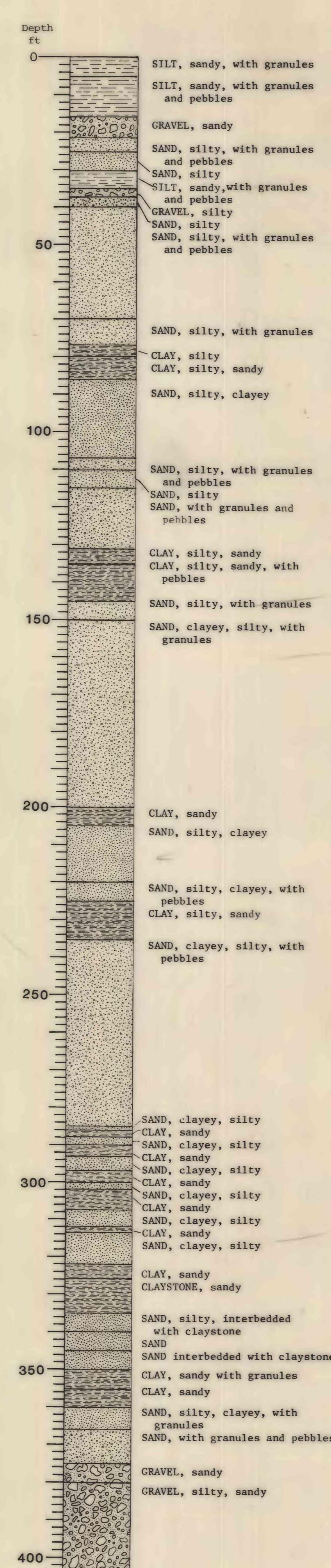


LITHIUM LOG  
(J. D. Vine, 1978, written commun.)GAMMA - RAY LOG  
[c/s]

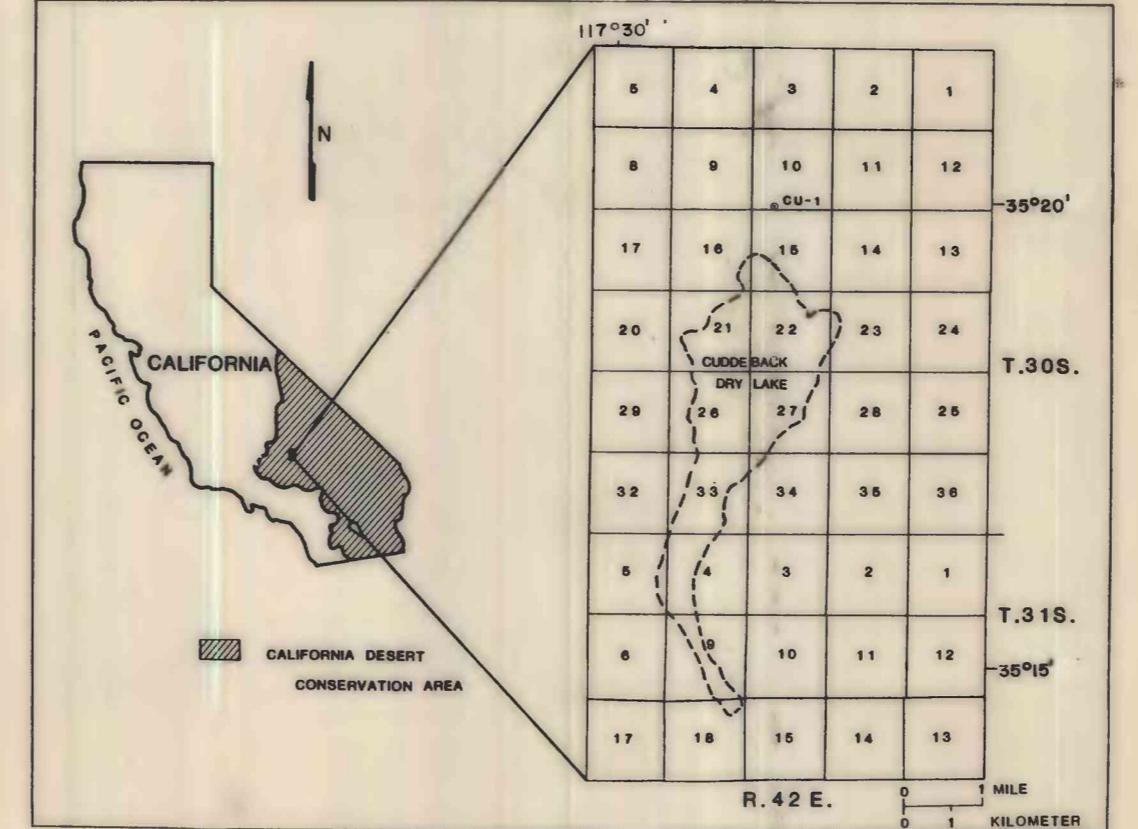
## COLUMNAR SECTION



## LITHOLOGIC LOG

Depth (ft)	Description	Depth (ft)	Description cont.
0 - 5	Silt, moderate-yellowish-brown (10% 5/4 dry), noncalcareous, and median to coarse sand, with occasional granules. Unit composed of 70 percent silt and 30 percent sand.	131 - 135	Clay, silty, calcareous with median to very coarse sand. Unit composed of 80 percent silty clay and 20 percent sand.
5 - 16	Silt, moderate-yellowish-brown (10% 5/4 dry), noncalcareous, and median to very coarse sand with granules and small pebbles up to 5 mm across. Unit composed of 50 percent silt, 40 percent sand, and 10 percent granules and pebbles.	135 - 140	Clay and sand. Lithology similar to 131-135 ft, but with occasional subrounded andesite pebbles as much as 20 mm across. Unit composed of 65 percent clay and 35 percent sand and pebbles.
16 - 21.5	Gravel, pebbles and granules, as much as 20 mm across, composed of quartzite and andesite fragments and very coarse sand. Unit composed of 60 percent gravel and 40 percent sand.	140 - 145	Clay and sand. Lithology similar to 135-140 ft, but pebbles are subangular quartz.
21.5 - 22	Sand, fine to very coarse, with occasional granules in a calcareous cement. Calcite as cement comprises 30 percent of unit.	145 - 150	Sand, coarse to very coarse, with granules and occasional subangular to subrounded granite pebbles as much as 20 mm across in a moderate-yellowish-brown (10% 5/4) calcareous silt matrix. Unit composed of 60 percent sand, granules, and pebbles, and 40 percent silt.
22 - 25	Sand, fine to very coarse, with a few scattered subrounded pebbles of black, red, and gray andesite in a calcareous, moderate-yellowish-brown (10% 5/4) silt matrix. Pebbles are 20 mm across. Unit is composed of 55 percent sand and pebbles, and 15 percent matrix.	150 - 160	Sand, median to very coarse, and granules in a grayish-orange (10% 5/4), calcareous, clayey silt matrix. Unit composed of 70 percent sand and granules, and 20 percent silt.
25 - 30	Sand, medium to very coarse, in a grayish-orange (10% 5/4), calcareous silt matrix. Matrix contains slight amount of clay. Unit is composed of 50 percent sand and 20 percent silt.	160 - 200	Sand, coarse to very coarse, and granules and occasional subangular to subrounded granite pebbles as much as 20 mm across in a moderate-yellowish-brown (10% 5/4) calcareous silt clay matrix.
30 - 35	Silt, grayish-orange (10% 5/4) to moderate-yellowish-brown (10% 5/4), calcareous, with fine to very coarse sand. Unit composed of 50 percent silt and 50 percent sand and gravel.	200 - 205	Clay, moderate-yellowish-brown (10% 5/4), calcareous, and some medium to coarse sand. Unit composed of 90 percent clay and 10 percent sand.
35 - 37	Gravel, angular to subangular, as much as 40 mm across, composed mainly of andesite and some quartzite in a moderate-yellowish-brown (10% 5/4), calcareous silt matrix.	205 - 225	Sand, coarse to very coarse, with a moderate-yellowish-brown (10% 5/4), silty clay matrix. Matrix comprises 20 percent of unit, but increases to 5 percent near base. Unit contains coarse to subangular and subangular pebbles as much as 20 mm across below 220 ft.
37 - 40	Sand, coarse to very coarse, poorly sorted, with minor amounts of angular to subangular granules and pebbles as much as 20 mm across, in a moderate-yellowish-brown (10% 5/4), calcareous silt matrix. Unit composed of 70 percent sand and 25 percent matrix.	225 - 235	Clay, light-brown (5% 5/6), silty, calcareous, and coarse to very coarse, angular to subangular sand. Unit composed of 55-60 percent silty clay and 40-45 percent sand.
40 - 45	Sand, very fine to very coarse, poorly sorted, with minor amounts of angular to subangular granules and pebbles as much as 20 mm across, in a moderate-yellowish-brown (10% 5/4), calcareous silt matrix. Unit composed of 70 percent sand and 25 percent matrix.	235 - 260	Sand, coarse to very coarse, with a moderate-yellowish-brown (10% 5/4), silty clay matrix. Matrix comprises 5 percent of unit. Unit also contains a 2-3 ft thick pebbly clay layer at 243 ft and a 1 ft thick pebbly clay layer at 250 ft.
45 - 60	Sand, with granules and pebbles in a silt matrix. Lithology similar to 40-45 ft, but pebbles are as much as 30 mm across. Unit is angular to subangular, composed of andesite and quartz monocrystalline fragments. Unit is composed of 70 percent sand and granules, and 20 percent matrix.	260 - 285	Sand, coarse, with pebbles as much as 15 mm across in a light-brown-gray (5% 5/6), calcareous, silty clay matrix. Unit composed of 70-80 percent sand, 1-2 percent pebbles, and 20-25 percent matrix.
60 - 65	Sand, very fine to very coarse (mainly medium) with scattered subrounded to subangular andesite pebbles in a moderately-yellowish-brown (10% 5/4), calcareous silt matrix. Unit contains some caliche cemented sand layers. Unit contains approximately 20 percent matrix.	285 - 326	Sand, coarse, to very coarse in a moderate-yellowish-brown (10% 5/4), calcareous, clayey silt matrix, and interbedded of angular-to-subangular andesite pebbles. Unit is composed of varying amounts of matrix to angular-to-subangular andesite pebbles. Interbeds range from 266-288 ft, 290-293 ft, 297-300 ft, 302-305 ft, 306-307 ft, 312-315 ft, and 322-325 ft. Between 310 to 320 ft the clayey silt matrix is grayish-yellow (10% 5/4) and the interbedded clays are light brown (5% 5/6) and well indurated.
65 - 70	Sand, very fine to medium, angular to subangular, poorly sorted, with scattered granules in a light-brown (5% 5/6), calcareous silt matrix. Some sand zones cemented by caliche.	326 - 335	Claystone, light-brown (5% 5/6), calcareous, well indurated, with coarse to very coarse sand.
70 - 77	Sand with scattered granules in a silt matrix. Lithology similar to 65-70 ft, but matrix is moderate-yellowish-brown (10% 5/4) and contains some clay. Caliche also present throughout unit.	335 - 345	Sand, medium to very coarse, in a calcareous, grayish-orange, silty matrix, and claystone interbeds similar to 325-335 ft. Claystone absent below 300 ft.
77 - 80	Clay, light-brown (5% 5/6), silty, calcareous	345 - 350	Sand and claystone. Lithology same as 335-340 ft, but matrix is dark-yellow (5% 6/4).
80 - 86	Clay, moderate-yellowish-brown (10% 5/4), silty, calcareous, with silt, medium sand, and occasional coarse sand. Unit is composed of 70-75 percent clay and 25-30 percent sand.	350 - 355	Clay, grayish-orange (10% 7/4), silty, calcareous, with abundant angular-to-subangular andesite granules, and coarse to very coarse sand.
86 - 90	Sand, grayish-orange (10% 7/4), fine to medium, angular to subangular in a compact, calcareous, clayey silt matrix. Unit contains some zones of caliche cemented, poorly sorted sand.	355 - 360	Clay, dusky yellow (5% 6/4) from 355-358 ft and pale-red from 358-360 ft, calcareous, with 5 percent coarse to very coarse, angular to subangular sand.
90 - 95	Sand in a clayey silt matrix. Lithology similar to 86-90 ft, but unit is dusky-yellow (5% 6/4).	360 - 366	Sand, medium to very coarse, and granules in a dusky-yellow (5% 6/4), calcareous, silty clay matrix. Unit composed of 50 percent sand and granules, and 50 percent matrix. Granules rare and predominantly composed of andesite.
95 - 107	Sand in a clayey silt matrix. Lithology similar to 86-90 ft, but unit is moderate-yellowish-brown (10% 5/4).	366 - 375	Sand, coarse to very coarse, and granules with some pebbles, and 1 ft to 2 ft medium sand layers. Unit composed of 55 percent coarse sand to granules, 4-5 percent fine to medium sand, and 1 percent pebbles. Pebbles composed of quartz monocrystalline and andesite dicitrite, and quartzite as much as 30 mm across.
107 - 110	Sand, coarse to very coarse, angular to subangular with subrounded andesite granules and pebbles as much as 20 mm across, in a grayish-orange (10% 7/4), calcareous silt matrix. Matrix contains 10 percent of unit.	375 - 390	Gravel, pebbles and granules, as much as 15 mm across, composed of diabase and andesite fragments. Matrix is medium to coarse sand matrix. No caliche. Matrix contains only 10 percent of the sample above 380 ft. Below 380 ft matrix is 5 percent of unit.
110 - 115	Sand, medium to very coarse (mainly medium) in a variegated, calcareous, clayey silt matrix. The clayey silt is moderate-yellowish-brown (10% 5/4), light-brown (5% 5/6), and grayish-orange (10% 7/4).	390 - 395	Gravel in a sand and silt matrix. Lithology similar to 375-390 ft, but matrix contains moderate-brown (5% 3/4) silt.
115 - 120	Sand with silt matrix. Lithology similar to 107-110 ft, but matrix is moderate-brown (10% 5/4), comprises 5 percent of unit, and is noncalcareous. Pebbles composed of quartz monocrystalline, andesite dicitrite, and quartzite as much as 30 mm across.	395 - 400	Gravel in a sand and silt matrix. Lithology similar to 375-390 ft but less matrix (about 1 percent), and gravel is predominantly (about 75 percent) very-dark-red (5% 2/6) andesite fragments.
120 - 131	Sand, coarse to very coarse, with scattered granules in a moderate-yellowish-brown (10% 5/4), calcareous, clayey silt matrix. Unit composed of 70 percent sand, 5 percent granules, and 25 percent matrix. Below 123 ft, unit composed of 60 percent sand, 15 percent granules and small pebbles as much as 15 mm across, and 25 percent matrix.	400 - 405	Gravel in a sand and silt matrix. Lithology similar to 375-390 ft but gravel is predominantly (50-60 percent) feldspar fragments.

## INDEX MAP

Chemical analyses of ground water from test well CU-1, Cuddeback Dry Lake, California  
[Analyses by U.S. Geological Survey, Denver, Colo.]

Test well-sample No.	Date sample collected	Sample depth (ft)	Specific conductance (Micromho/cm at 25°C)	pH	Temperature, water (°C)	Specific gravity	Hardness, total (CaCO3)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO3)	Alkalinity, total (HCO3)	Sulfate (SO4)	Chloride (Cl)	Fluoride (F)	Ionide (I)	Silica (SiO2)	Solids, residue on evaporation to 480°C (mg/l)	Nitrate plus nitrite (N)	Phosphate (P)	Boron (B)	Iron (Fe)	Lithium (Li)	Manganese (Mn)	Serious (Sr)	Uranium (U)	
0-1-1	6/16/78	75	1,805	7.8	22.4	1.010	250	77	13	300	20	166	120	120	480	1.0	0.05	59	1,180	4.3	0.00	1,400	20	370	70	1,500	3.0
0-1-2	6/16/78	400	5,717	7.8	25.3	1.010	380	110	15	1,100	49	118	97	120	1,800	1.1	.16	75	3,410	2.3	.00	3,100	20	640	140	2,100	.80

\* Calculated.

## INTRODUCTION

## DISCUSSION

The Federal Land Policy and Management Act of 1976 (Public Law 94-579) directed the Secretary of the Interior to prepare and implement by September 1980 a comprehensive land-use plan for the conservation, use, and protection of public lands within the California Desert Conservation Area (CDCA). The responsibility to prepare this plan was assigned to the Bureau of Land Management (BLM). During planning, the BLM and the USGS were directed to evaluate mineral as well as botanical, wildlife, cultural, and recreation resources data for effective multiple-use land planning. In turn, the BLM requested assistance from the U.S. Geological Survey (USGS) to develop a geologic map of the CDCA.

In 1976 the USGS drilled 26 shallow test wells to depths of 50-600 ft to provide BLM with the requested mineral resource data. The lithologic, water quality, and geophysical data obtained from one of these test wells drilled near Cuddeback Dry Lake, Calif., are presented in this report.

## LOCATION AND DRILLING METHODS

Test well CU-1 was drilled in SW1/4 sec. 10, T. 30 S., R. 42 E., Nev., California (Lat. 35°19'37" N., Long. 117°27'54" W.) on the margin of Cuddeback Dry Lake (see index map). This test well was completed in June 1976 using a dual-wall drill rig. Drilling fluids, a mixture of air and water, were pumped down the outer annulus of dual-wall drill pipe to an open face port bit. Drilling fluid and cuttings were returned to the surface where samples were collected. This drilling technique ensured recovery of uncontaminated sediment or ground-water samples because the return cuttings or ground-water samples were taken in the bore hole. In situ ground water was used as a drilling fluid where possible; otherwise, a fine mist of imported freshwater and air was used.

A continuous lithologic log was completed during drilling. Sediment samples were collected at 5-ft intervals and were described in the field. Field lithologic descriptions were supplemented by microscopic study when the samples were sent to the laboratory. Sediment names used in this report are those defined by Folk (1968). The rock-color chart (Goddard and others, 1968) was used to color classify damp to wet samples. Lithologic log percentages are approximate.

Ground cuttings were analyzed for lithium (Li) by the USGS, in Denver, Colo. Lithium analyses are included in this report to complete the mineral resource appraisal on Cuddeback Dry Lake.

## WATER QUALITY

Ground-water samples were collected at the first aquifer having measurable flow into the borehole and near the bottom of the test well by stopping the pump and letting air through the drill string because the well before conventional open-hole logs could have been run in the well. Before the log can be interpreted, corrections must be made for the effect of air bubbles in the borehole. Corrections for air bubbles, using the Schlumberger Chart RR-8, are listed below. The corrected log will approximate the natural radioactivity, but quantitative measurement is not possible, inasmuch as the sonde was not calibrated.

Total thickness of dual-wall drill pipe: 0.63 in.	Total thickness of dual-wall drill pipe: 0.63 in.
Drill string inner diameter: 2.47 in.	Drill string outer diameter: 1.25 in.
Outer diameter: 4.5 in.	Logging speed: 17 ft/min

## ACKNOWLEDGMENTS

G. Thomas Server supplemented field lithologic descriptions by laboratory study of sediment cuttings under binocular microscope. J. D. Dockter, U.S. Geological Survey, Denver, Colo., ran the geophysical log.

## REFERENCES

- Folk, R. L., 1968, Petrology of sedimentary rocks: Austin, University of Texas, 170 p.
- Goddard, E. N., chm., and others, 1948, Rock-color chart: National Research Council; reprinted by Geological Society of America, 1951, 1963, 1970, 1976, 1 p.

## NOTE

Data from test well CU-1, SW1/4 sec. 22, T. 30 S., R. 42 E., Nev., are published in Open-File Report 80-1033